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IN THE CLAIMS

1. A method for managing the distribution of datapackets, the method comprising the steps of:

associating a service-level policy that limits allowable bandwidths to particular nodes in a hierarchical network;

classifying datapackets moving through said hierarchical network according to a particular service-level policy;

managing all datapackets moving through said hierarchical network from a variable-depth queue in which each queue entry includes service-level policy bandwidth allowance for a node in said network through which a corresponding datapacket must pass;

repeatedly scanning said variable-depth queue to determine whether a datapacket should be forwarded through said node by checking for enough bandwidth-allocation credits; and

replenishing an account of said bandwidthallocation credits taking into account a variable delay caused by scanning said variable-depth queue.

2. The method of claim 1, further comprising the step of:

testing in parallel whether a particular datapacket should be delayed in a buffer or sent along for every hierarchical node in said network through which it must pass.

3. The method of claim 1, further comprising the step of:

constructing a single queue of entries associated with corresponding datapackets passing through said hierarchical network such that each entry includes a pointer to the actual packet node pointers and the corresponding hierarchical nodes that point to the data structures containing available bandwidth credits in said network through which a corresponding datapacket must pass.

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4. A means for managing the distribution of datapackets, comprising:

means for associating a service-level policy that limits allowable bandwidths to particular nodes in a hierarchical network;

means for classifying datapackets moving through said hierarchical network according to a particular service-level policy;

means for managing all datapackets moving through said hierarchical network from a variable-depth queue in which each queue entry includes service-level policy bandwidth allowance for a node in said network through which a corresponding datapacket must pass;

means for repeatedly scanning said variable-depth queue to determine whether a datapacket should be forwarded through said node by checking for enough bandwidth-allocation credits; and

means for replenishing an account of said bandwidth-allocation credits taking into account a variable delay caused by scanning said variable-depth queue. 5

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5. The means of claim 4, further comprising:

means for testing in parallel whether a particular datapacket should be delayed in a buffer or sent along for every hierarchical node in said network through which it must pass.

6. The means of claim 4, further comprising:

means for constructing a single queue of entries associated with corresponding datapackets passing through said hierarchical network such that each entry includes a pointer to the actual packet node pointers and the corresponding hierarchical nodes that point to the data structures containing available bandwidth credits for every hierarchical node in said network through which a corresponding datapacket must pass.

7. A network management system, comprising:

a protocol processor providing for header inspection of datapackets circulating through a network and providing for an information output comprising at least one of source IP-address, destination IP-address, port number, and application type;

a classifier connected to receive said information output and able to associate a particular datapacket with a particular network node and a corresponding service-level policy bandwidth allowance;

a variable-depth queue comprising individual entries related to said datapackets circulating through said network, and further related to a network node through which each must pass; and

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a traffic-shaping cell providing for an inspection of each one of said individual entries and for outputting a single decision whether to pass through or buffer each of said datapackets in all network nodes through which each must pass;

wherein, the traffic-shaping cell repeatedly scans said variable-depth queue to determine whether a datapacket should be forwarded through said node by checking for enough bandwidth-allocation credits, and it replenishes an account of said bandwidth-allocation credits taking into account a variable delay caused by scanning said variable-depth queue.

- 8. The system of claim 7, further comprising:

 an output scheduler and marker for identifying
 particular ones of the individual entries in the variabledepth queue that are to be passed through or buffered.
- at least one of the protocol processor, classifier, and traffic-shaping cell, are implemented as a semiconductor intellectual property and operate at run-time with the variable-depth queue.

9. The system of claim 7, wherein: